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DISEASE AMONG TEXAS CATTLE.

A CONTINUATION OF THE REPORT MADE TO THE ASSOCIATION
AT THE NEW ORLEANS MEETING, DECEMBER, 1880.

BY

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READ BEFORE THE AMERICAN PUBLIC HEALTH ASSOCIATION, AT SAVANNAH, GA.,
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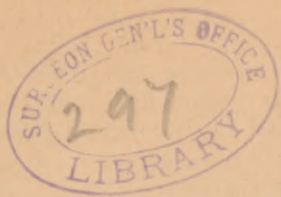


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DISEASE AMONG TEXAS CATTLE.

A Continuation of the Report made to the Association at the New Orleans Meeting, December, 1880.

BY DR. JOSEPH R. SMITH,

Surgeon U. S. Army.

SINCE my report made to this Association in December, 1880, additional reports, both in regard to disease in Texas cattle and the pathological conditions in beeves killed for food, have been received, and the table on pages 4, 5 embodies the description of the pathological appearances. This table is in the same form and is to be considered in connection with and as part of the table published on pages 241 and 242 of the sixth volume of the "Transactions of the American Public Health Association."

The questions asked are on the following subjects : —

1. As to age of animal killed.
2. Oldest animal known.
3. Bloody serum in pericardium.
4. Ecchymosis on heart.
5. Weight of liver.
6. Fatty degeneration of liver.
7. Reddening of gall-bladder.
8. Size of spleen.
9. Color and consistence of spleen.
10. Appearances of renal pelves.
11. Appearances of lining membranes of bladder.
12. Appearance and consistence of abomasus.
13. Temperature.
14. Other pathological appearances.
15. Epidemic diseases.
16. Imported cattle and their health and diseases.
17. Mortality.
18. General information on the former or cognate subjects.

The facts and conclusions are based on tables, on numerous letters received, and on personal interviews between myself and twenty-seven different stock raisers and drovers. Post mortem examinations of several hundred (two hundred and fifty reported quite in detail) animals were made by fifteen observers, and in fourteen localities in northern, southern, and western Texas. Of these, all except thirteen are reported as healthy at all seasons of the year. This number is not very great, but it is believed

to be sufficient to give very definite results, while on the other hand this very limitation in number enabled the observer to make thorough, deliberate, and careful examinations.

AGE. — The following is the proportion of animals killed at different ages as reported: —

One to two years old59 per cent.
Two to three years old	23.22 per cent.
Three to four years old	20.24 per cent.
Four to five years old	23.81 per cent.
Five to six years old	5.36 per cent.
Six to seven years old	9.52 per cent.
Seven to eight years old	2.98 per cent.
Eight to nine years old	6.55 per cent.
Nine to ten years old	1.19 per cent.
Ten to eleven years old	2.98 per cent.
Eleven to twelve years old59 per cent.
Twelve to thirteen years old59 per cent.
Thirteen to fourteen years old	2.38 per cent.

Since the above percentages were calculated, three cases have been reported as killed at four, and two at five, years old. The addition of these would make a scarcely appreciable increase in the per cent. of animals killed at these years.

Between the ages of two and five, two thirds of all the animals were killed, and more than four fifths between the ages of two and seven.

The cases of diseased liver reported were found in cattle aged as follows: one aged six, one aged nine, two aged eight, and two aged thirteen. The other cases occurred in cattle whose age is not reported.

Cattle are reported to have attained a maximum age of twenty-five, and all above twenty, the cause of whose death is known, died of old age, many of them reported as toothless. Very few cattle could be found to have reached the age of fifteen, being generally killed for beef before attaining that age. One cow is reported by Surgeon Waters as giving milk at nineteen years of age.

Mr. Gooch, of Mason, writes: „This question could not be answered by many of us who raise cattle, as we keep no account of their age, more than we know that they live to be quite old when compared with the age of cattle in the Northern climate. I would say that twenty years old is not an uncommon age. Mr. G. Brandenburger, of this county, told me, about three years ago, that out of twenty or twenty-five cows (I do not remember the exact number) he had purchased twenty-one years previous he then had two of the original stock left, and that the cattle were from four to five years old when he purchased them, which would make the two living at that time not less than twenty-five years old; and one remarkable feature in the premises is the fact that these old cows continued to breed.”

Appearances of Heart. — Every observer, save three, reports that no bloody serum was found in the pericardium, and no ecchymosis appeared on either outer or inner surface of the heart; one adding, “all hearts normal;” another, “all found perfectly healthy;” another, “the outer and inner surfaces of the heart were uniformly healthy and normal in every animal.”

Of the exceptional "three" referred to, one makes no report on the subject; one says, "not known;" and the third reports, in twelve cases out of fifty, that the pericardia contained bloody serum.

In response to further inquiry on the subject in a letter from me asking this officer (Dr. Buffington, at Fort Ringgold) for further details of the pathological appearances reported by him, he replies to me: "Eleven of the twelve cases of bloody serum in the pericardium are erroneously reported, but one occurred. I cannot imagine how a mistake was made in reporting so many cases of bloody serum in the pericardium, as I remember my answers to the different queries."

"My memory is very vivid on the subject, which causes no doubt in my mind as to the correctness of my (this) statement."

Liver and Gall Bladder.—One observer, Dr. Buffington, reports four cases of fatty degeneration in fifty autopsies. This same officer reported the sole cases of bloody serum in the pericardium, and in two of the same animals these morbid appearances co-existed. The same observer reports that in eight specimens the gall bladder showed reddening, and in three specimens was "light red." Two of these cases of reddening of the gall bladder occurred in the cases of fatty degeneration reported.

In two cases the gall bladder is reported as distended, one of the distended gall bladders being accompanied with no other morbid appearance, and the other occurring with a liver weighing thirteen and one fourth pounds, and in a state of fatty degeneration.

Three of the cases of fatty degeneration were of the largest livers found at Ringgold, and weighing respectively thirteen and one fourth pounds, twelve and a half pounds, and eleven and a half pounds. In the fourth case the liver weighed but seven and three fourths pounds. Of these four livers, that weighing seven and three fourths pounds was from a cow aged six years, weighing three hundred pounds, having a calf aged seven months, and giving a temperature of 102.6° F. The liver weighing eleven and a half pounds was from a steer nine years old, weighing six hundred and fifty pounds, and whose temperature is given as 102.2° F. The liver weighing twelve and a half pounds was from a steer eight years old, weighing four hundred and sixty pounds, temperature not given. The liver weighing thirteen and one fourth pounds was from a steer eight years old, weighing five hundred pounds, temperature not given.

Further report from Dr. Buffington says, under date of October 19, 1881, "Full assurance as to the existence of fatty degeneration of the liver was not had, as the microscope was not used, none being available; but I am satisfied in myself that it did exist from the color it presented, and general appearance, and also reasoning by exclusion."

Four cases of nutmeg liver are reported by Dr. Taylor, who also observed at Fort Ringgold, but subsequently to Dr. Buffington. They all occurred in steers two years old, weighing respectively 500, 600, 730, and 500 pounds, and whose livers, in the same order, weighed $8\frac{1}{2}$, $7\frac{1}{2}$, $7\frac{1}{2}$, and $6\frac{1}{2}$ pounds, the temperature of the first and third in the list being respectively 103.8° F., and 102.2° F., the temperature of the others undetermined.

Table of Pathological Appearances in Texas Cattle.

1st Question.	2d Question.	3d Question.	4th Question.	5th Question.	6th Question.	7th Question.	8th Question.	9th Question.
Asst. Surg. P. Middleton, U. S. A., San Antonio, Texas.	Oldest 17. Cause of death unknown.	No.	No.	8½ lbs.	2 livers from cows over 13 years of age were filled with small abscesses containing bloody pus and serum, the rest healthy.	No, except in the cases mentioned under No. 6.	21 in. by 4½. Weight 3 lbs.	Dark pur- pie. Consistence of jelly.
Dr. A. L. Buffington, Fort Ringgold, on the Rio Grande.	20. Old age.	In 3 cases only out of 20.	No.	Av. 8½ lbs. Max. 13½. Min. 5½.	Fatty degeneration in 2 cases in 20.	Yes, in 6 cases out of 20.	20½ by 5.45. Max. length, 23. Max. breadth, 7. Min. length, 17. Min. breadth, 4½. Weight, av. 2 lbs. 3 oz. Max. 22 × 5 in.; 3 lbs. Min. 13 × 3 in.; ½ lb.	Purple all. All pulpy.
Asst. Surg. J. L. Powell, U. S. A., Fort Griffin, on the Brazos, N. E. Texas.	15. Old age and severe winter.	No.	No.	Largest 14 lbs. Smallest 8½.	No.	No.	Max. 22 × 5 in.; 3 lbs. Min. 13 × 3 in.; ½ lb.	Dappled, blue, or slate.
Surg. W. E. Brown, U. S. A., Fort Davis, Texas.	Could not ascertain.	No.	No.	Av. 10½ lbs. Max. 12½. Min. 8½.	No.	No.	Max. 22 length, 3½ breadth, 4 lbs. Min. 13 length, 5½ breadth, 1 lb. Aver. 17½ length, 4½ breadth, 2½ lbs.	Gravish blue, with slate-colored spots on external surface. Dark red substance, firm and solid.
W. F. Carter, Asst. Surg., U. S. A., Fort Concho, Texas, on river of same name.	-	-	-	-	-	-	-	-
Asst. Surg. E. Woodruff, U. S. A., Fort Stockton, Texas.	20. Not known.	No.	No.	Av. 9½ lbs. Max. 11 lbs. Min. 8 lbs.	No.	No.	Aver. 14 × 4 in.; 2½ lbs. Max. weight, 2½ lbs. Min. weight, 1½.	Pearly gray. Firm.
Asst. Surg. B. D. Taylor, U. S. A., Fort King gold.	Not reported.	Yes, in 9, 46 not reported.	Not reported.	Av. 7½ lbs. Max. 11 lbs. Min. 4½ lbs.	Yes, in 1 case, 4 nutmeg.	In 3 cases light red.	Av. length, 19, br., 5 in. Max. length, 25, br., 12 in. Min. length, 16, br., 3½ in. Av. weight, 2-3 lbs. Max. weight, 5½ lbs. Min. weight, 1½ lbs.	Bluish gray or slate 6 light red. 1 streaked.
Surg. J. C. G. Happersett, U. S. A., Fort Brown, Mouth of Rio Grande.	25.	No.	No.	Av. 8½ lbs. Max. 9 lbs. Min. 7½ lbs.	No.	No.	Av. length, 18.4, br., 4.4 in. Max. length, 20, br., 4.5 in. Min. length, 18, br., 4 in. Av. weight, 2.4 lbs. Max. weight, 3 lbs. Min. weight, 1.9 lbs.	Gray or lead color.
Asst. Surg. J. B. Girard, U. S. A., Fort Davis.	Not known.	No.	No answer.	Av. 9 lbs. Max. 10½ lbs. Min. 8 lbs.	No.	In one case a few patches of infection.	Av. 19 × 5. Weight, 2.2. Max. 22 × 5½. Weight, 2½. Min. 18 × 4½. Weight, 1½. 23 × 5½ × 1½.	Light grayish purple, speckled with white, doughy rather than firm.
Asst. Surg. V. Havard, U. S. A., Presidio.	20 to 25.	No.	No.	Not reported.	No.	No.	23 × 5½ × 1½.	Dark red. Rather soft and brittle.

10th Question.	11th Question.	12th Question.	13th Question.	14th Question.	15th Question.	16th Question.	17th Question.	18th Question.
Asst. Surg. P. Middleton, U. S. A., San Antonio, Texas.	No. But of dull white.	Healthy. No traces of hemorrhage.	Healthy. Stained from contents. No spots.	No answer.	No.	Yes. Suffer more or less until acclimated.	No answer.	No answer.
Dr. A. L. Buffington, Fort Kinggold, on the Rio Grande.	3 dark. 2 dark red. 2 streaked. 3 not stated.	1 red. 1 red, slightly. 1 hemorrhage. 17 not stated.	5 flaccid. 9 petechiæ. 1 slightly congested. 5 no report.	Av. 102½°. 8 observations.	Hollow horns from April to December.	None.	10 per cent. want of water and screw worm.	Beef miserable ¾ the year, fair other ¼.
Asst. Surg. J. L. Powell, U. S. A., Fort Griffin, on the Brazos, N. E. Texas.	Dark red. Not stated.	Peach, amber. No hemorrhage.	Stained by contents. Not flaccid or spotted.	Not stated.	None.	Yes. ¾ die in 1 year of murrain. No precautions.	3 per cent. old age.	Vide body of report.
Surg. W. E. Brown, U. S. A., Fort Davis, Texas.	Yellow and fatty. Not streaked.	Yellowish. No hemorrhage.	Dark muddy yellow. No.	Not determined.	Vide body of report.	None.	Not determined.	Nothing additional.
W. F. Carter, Asst. Surg. U. S. A., Fort Concho, Texas, on river of same name.	-	-	-	-	-	-	-	Rarely present any disease save of liver.
Asst. Surg. E. Woodruff, U. S. A., Fort Stockton, Texas.	Rather dark. Not streaked.	White. No hemorrhage.	Pale pink. No.	Not determined.	Vide body of report.	None.	No answer.	In much better order than last year.
Asst. Surg. B. D. Taylor, U. S. A., Fort Kinggold.	25 dark colored. 29 no report.	Pale yellowish.	13 flaccid. 16 spotted. 25 not reported. Pale greenish.	Av. 102½°. Max. 103 4-5°. Min. 100 3-5°.	-	-	-	No answer.
Surg. J. C. G. Happersett, U. S. A., Fort Brown, Mouth of Rio Grande.	No. Brown or chocolate.	Pale straw or yellow. No hemorrhage.	Ashy gray. Pinkish gray. Normal.	Av. 102½°. Max. 103½°. Min. 101½°.	None.	In two cases. Died the first summer. No special precautions.	No information.	Vide body of report.
Asst. Surg. J. B. Girard, U. S. A., Fort Davis.	Light. Not streaked.	Grayish white. No hemorrhage.	Pale rose or pinkish. No stains or spot. Flaccid.	No observations.	Vide body of report.	No.	Not determined.	Vide body of report.
Asst. Surg. V. Havard, U. S. A., Presidio.	Red and smooth.	Pearl white. No hemorrhage.	White. Rather flaccid. Not stained or spotted.	No observations.	None. Vide body of report.	None.	10 per cent exposure and casualties. Mainly among calves.	Good.

In these four cases it is further expressly stated, "other organs healthy."

Five other cases of diseased liver are reported as follows. Dr. Gorgas says: "The livers in all cases were markedly yellow, and somewhat softer than they should be. The color had the appearance of bile-staining, though there was no catarrh of gall duct or small intestine. The natives attribute it to the animals eating cactus. Only one liver could I call diseased (weighed ten pounds). This was firmer than usual, and at several points the proper substance of the organ was replaced by a firm white tissue resembling cicatrized tissue. All other organs normal, and the animal, before death, apparently in good health."

No liver reported by this observer of greater weight than ten pounds.

Dr. Middleton, from San Antonio, says: "Nineteen of the livers examined were healthy, and two from cows over thirteen years of age were diseased; these livers were filled with small abscesses containing pus and bloody serum. None of the gall bladders showed signs of reddening, except the two above mentioned."

Dr. Davis, from Corpus Christi, writes: "In two of the specimens multiple abscesses of small size, conjoined with considerable congestion, were found. Small calcareous deposits were observed in one of these specimens."

"No evidence of abnormal reddening was seen upon examination of the gall bladders, the inner surface being of a faint pinkish color; when recently taken from the animal, changing to a greenish cast from post mortem absorption."

No other abnormal appearance of liver or gall bladder is recorded by any of the observers.

The average weight of the liver appears to be between seven and eight pounds, or 7.54 pounds, fifteen pounds being the maximum, and four and a half the minimum.

The average weight of animals reported killed at different ages, and the average weight of their livers, was as follows:—

Average Weight of Animal.	Average Weight of Liver.	Age.
475.45	7.14	2 years.
441.66	6.82	3 years.
385.42	6.92	4 years.
258.33	8.66	5 years.
355.71	7.95	6 years.
275.00	7.33	7 years.
405.71	9.25	8 years.
550.11	11.00	9 years.
398.75	8.75	10 years.
450.00	9.00	11 years.
400.00	7.87	13 years.

As far as these figures go they would not seem to show that the weight of the liver varied proportionately, either with the weight of the animal or its age; still the variation was rather with the age than with the size; for while the average weight of animals seven years old and upwards exceeded

the weight of those six years and under but about one sixtieth, the weight of the livers of these same older exceeded the weight of the same younger about one seventh.

Larger observations would probably change these proportions.

Spleen: Size, Color, and Consistence. — Generally but two dimensions of this viscus have been given, viz., length and breadth the thickness being given by two observers only, and as "one and a half inches in thickness," and "a little over one inch thick in its thickest" part.

Of course, but two dimensions give but an indefinite idea of size. The greatest length of spleen reported was twenty-five inches, while the maximum weight observed was five and three fourths pounds.

These maxima all occurred in different spleens.

The spleen weighing five and three fourths pounds measured twenty-one by five inches.

The spleen twenty-five inches long weighed three and a half pounds; and the one twelve inches in width weighed five and a half pounds.

The spleen weighing five and three fourths pounds was "dark-colored," was found in a cow, four years old, weighing three hundred and forty pounds, and having a calf three months old. It was reported by Dr. Buffington at Ringgold, who also found in the same case bloody serum in the pericardium, a liver weighing six and three fourths pounds, the lining membrane of the fourth stomach "spotted," the bladder "light red," and the temperature 102.6° F.

Three spleens only are reported that weighed as much as five pounds, three between four and five pounds, and four between three and four pounds. Of these ten spleens, all but one were found at Fort Ringgold, and but three occurred in connection with other morbid appearances. One of those has been mentioned above. In the second case, where the spleen weighed five and one eighth pounds, the animal was a steer five years old, weighing two hundred and fifty pounds. Its liver weighed seven pounds, and was healthy, while the lining membrane of its fourth stomach is described as "spotted." In the third case, heretofore mentioned, a steer weighing five hundred pounds, and aged eight years, the liver weighed thirteen and one fourth pounds, and showed signs of fatty degeneration, the gall bladder was reddened and much disturbed, the spleen was "pulpy," the pelvis of the kidneys "streaked," the lining membrane of the bladder showed hemorrhage, and the lining membrane of the fourth stomach petechiæ.

The minimum length reported is eight inches, the minimum breadth two and a half inches, and the minimum weight one pound.

The average weight of the spleens reported was almost exactly two pounds (1.98).

Of its consistence, one observer says that it is inclined to flabbiness, more than human spleen; one says soft, brittle, easily broken down, and very vascular; one says normal; one says consistence of jelly; one pulpy; one says doughy rather than firm; one rather soft and brittle; while four characterize it as firm, one of the four adding solid.

In regard to color: the interior part is uniformly spoken of as dark red.

The terms dark red are used also without indicating to what part it refers, while the exterior surface is described as mottled blue or grayish, normal, dark purple, purple, "dappled blue or slate," grayish blue with slate-colored spots, pearl gray, gray or lead color, light grayish purple streaked with spots of fat.

It would seem, in reference to consistency and color, that different observers, according to their particular idiosyncrasy, described the same condition by different terms.

Dr. Havard adds to his description, "the nodules and corpuscles clearly seen through the capsule."

Dr. Powell, who calls the color "dappled blue or slate," and the consistency "firm," adds, "they were all quite uniform in these respects. The size of the viscus seemed to vary with the age of the animals up to five years."

According to my figures, the weight increased regularly from two to five years of age, after which no rule in reference to age could be discovered.

Pelves of the Kidney.—To the questions whether the pelves of the kidney showed a bright red color, a dark color, or were streaked with blood, answers also differed.

The color is described as follows: "Light red," "white, with blush of pink," "dark color," "bright red" (by two), "dull white," "dark red," "yellow and fatty," "brown or chocolate," "rather dark," "light," "normal," and "red and smooth."

Most of the reports state there were no streaks. One observer only, Dr. Buffington, reports in two cases "streaked." One of these cases is the one previously described, of fatty liver weighing thirteen and one fourth pounds. The other was from a cow weighing three hundred and fifty pounds, and having a calf of two and a half months. This cow was aged six, furnished a liver weighing seven and one half pounds, and a reddened and distended gall bladder. A dark purple spleen, weighing two and three fourths pounds. Slightly reddened lining membrane of the bladder, and petechiæ in lining membrane of fourth stomach.

Lining Membrane of Bladder.—The color of this membrane is described with considerable uniformity, as "yellowish," "white," or "amber or cream color," or "faint pink," or by Dr. Buffington as "light red" and "reddened." This same observer reports one case as presenting traces of hemorrhage. This was the before-named steer, with a thirteen and one fourth pound fatty liver. No more minute description of these cases is given.

Fourth Stomach: Lining Membrane.—The inner surface of the abomasus is described in color as "greenish drab," as "dull red," as "pinkish white," as "bluish," as "dark, muddy yellow," as "pale pink," as "ashy gray," as "pale rose or pinkish," as "white," as "stained by contents."

The majority report this membrane as not flaccid, as not stained, and as not spotted; while several add the expression that they were healthy.

Dr. Davis, at Corpus Christi, states that in two instances they showed "stains and petechiæ spots," but gives no other details on the subject.

Dr. Buffington describes nine specimens as presenting "petechiæ," and sixteen as "spotted," and nine as flaccid.

None of those described as flaccid were spotted, nor do any of the other post mortem appearances described in these cases point to any pathological significance in either flaccidity or spots.

Temperature. — Six observers only succeeded in obtaining temperature. Dr. Harmer, at San Felipe, reports the temperature in one case as 98°. As he gives no details, and as the result varies so much from that obtained from other observations, I am inclined to think the bulb of the thermometer was not exposed a sufficient length of time to the bodily heat, and I regard this observation as valueless.

Below is given the temperature in each case, as noted by the other observers :

	Dr. Happersett.	Dr. Middleton.	Dr. Davis.	Dr. Taylor.	Dr. Buffington.
- -	- -	103.5°	103.2°	102.6°	102°
- -	- -	103.8	105	102	102.8
- -	- -	104	105.2	101.6	102.2
- -	- -	- -	101.4	102	102
- -	- -	- -	104.6	102.2	102.4
- -	- -	- -	- -	100.6	102
- -	- -	- -	- -	102.6	102.2
- -	- -	- -	- -	101.4	102.2
- -	- -	- -	- -	102.4	102.2
- -	- -	- -	- -	103.8	102.6
- -	- -	- -	- -	102	102.6
- -	- -	- -	- -	102.2	102.4
102°	- -	- -	- -	102.2	102.6
102.4	- -	- -	- -	- -	102.4
103.5	- -	- -	- -	- -	102.4
101.5	- -	- -	- -	- -	102.6
102	- -	- -	- -	- -	102.4
102.4	- -	- -	- -	- -	102.6
Average. . . .	102.3	103.75	103.88	102.31	102.38
Maximum . . .	103.5	104	105.2	103.80	102.8
Minimum . . .	101.5	103.5	101.4	100.6	102

Dr. Taylor says : " It will be noticed that, in many cases where the animal was otherwise perfectly healthy, the temperature was high, whether normal or not I cannot say. The temperature was taken by inserting the bulb of the thermometer directly into the blood flowing from the large arteries at the root of the neck." Dr. Taylor's temperature observations are from thirteen animals.

Dr. Buffington reports the temperature of eighteen animals.

Dr. Davis's remarks on this subject are published in my former report. He made five observations, which were doubtless reliable. Possibly the

minimum, taken in a struggling animal, may have been insufficiently exposed.

Dr. Middleton made three observations, and remarks as follows: "It is impossible to get the rectal temperatures of the cattle that are killed in this vicinity without a great sacrifice of thermometers. The above temperatures were taken by plunging the thermometer into the wound at the neck, while they were bleeding to death."

Other Pathological Appearances. — In my former report is mentioned a case of partial atrophy of the right lung, reported by Dr. Davis, erroneously credited to Dr. Harmer, and the remarks of Dr. Gorgas are repeated in this paper in connection with the weight, etc., of the liver.

No pathological appearances, save those above described, have been reported as seen by any of these observers.

The butcher at Fort Davis in July, 1881, stated that, in a herd from which some time previously he had killed beeves for Fort Davis, "he had almost constantly noticed the presence of calculi," about the size of a pea, in the kidney.

Prevailing Diseases; Importation of Cattle; Mortality among Cattle, and Cause, etc. — So far as appeared in my previous report, no disease was epidemic or prevailing among the cattle therein treated of.

Near Fort Duncan the mortality among cattle was reported about one per cent., and near McKavett as less than two per cent., from disease, — the cause of death being generally accidents and exposure.

At McKavett and Corpus Christi, cattle had been imported from the North, of whom large numbers had died, — *vide* letter of Mr. Gooch in my former report.

Dr. Buffington now reports from Ringgold that "the annual mortality is about ten per cent.; want of water and screw worms getting into branding wounds are the principal causes of death. Hollow horn usually exists for four months during the year, — from December to April."

Dr. Middleton, at San Antonio, says: "I know of no disease or epidemic prevailing among the cattle in this vicinity. A number of Northern cattle have been imported to this vicinity; so far as I can learn they suffer more or less until they become acclimated; many die; others recover and do well."

Dr. Happersett, from Fort Brown, writes: "Epidemic diseases are said to be unknown. I can at least find no evidence of pleuro-pneumonia in the cattle of this section.

"If we can place any dependence upon the evidence given by the stock-raisers, but few cattle die from any cause in this section; those that do, from inanition (starvation).

"I can find no evidence of any epidemic disease ever having appeared in this section, and cattle only die of what may be considered natural causes, in which I would include starvation.

"I can learn of but two stock-raisers in this vicinity who have made any effort to improve the grade of native cattle by *direct* importation from the North (outside this State). These gentlemen inform me that in every in-

stance the animals died the first summer. No special efforts were made to protect them from the extremes of climate."

Dr. Powell reports that at Fort Griffin he heard of no disease or epidemic prevailing among cattle.

He further says: "A large number of short-horn Durham bulls are imported from the Eastern and Northeastern States. No special precautions are taken to preserve their health, but they are allowed to live under the same surroundings as native Texas cattle. Almost one half of them die in twelve months with what the stock men term a *bloody* murrain and a *dry* murrain, the former characterized by a discharge of bloody urine, the latter by impaction of hard, dry, immovable faeces, in a hot, dry rectum. Both conditions are attended by high fever. On post mortem the bladder is found filled with blood, or the lower bowel hot and dry, and loaded as indicated. The two conditions do not appear to co-exist.

"In regard to the terms bloody murrain, dry murrain, and Texas fever, which have been referred to, it is proper to state that there seems to be no clearly defined basis upon which to rest a differential diagnosis; for while fever is a condition common to them all, from what are considered the same causes, there may arise disease manifesting itself as bloody murrain, dry murrain, or the Texas fever. This Texas fever is (*sic*) applied to the disease arising among local herds, consequent upon the passage of Southern cattle to the North, and differs in no respect, as to its post mortem features, from the bloody and dry murrain which seem to spring from climatic influences. Its name, therefore, is derived not from any characteristic pathological lesion, but from its source of origin, — a distinction without a difference.

"So far as I am able to learn, the annual mortality among native Texas cattle in that section does not exceed three per cent., and death in these cases is not due to any specific disease, for it occurs almost exclusively among old animals — cows — which are unable to stand the winters and consequent want of prairie-grass.

"My interviews with a number of experienced stock-raisers elicited some conflicting opinions. It seemed to be agreed, however, that the passage of Southern cattle on the drive to the North did at times affect the health of local herds with which they came in contact, while it was at the same time admitted that these Southern herds were themselves free from disease."

Dr. Powell here gives the explanation offered him by a Mr. George Reynolds, that purulent matter from the sore feet of the traveling cattle is left by them in the grass, taken into the stomachs of the local cattle, and produces Texas fever.

"In proof of this fact, he (Mr. Reynolds) cites the case of a herd which, to his knowledge, a few years ago, passed along the southern bank of the Arkansas River, after which a great many cattle of the local herds on that side sickened and died, while those cattle which were on the other side of the river remained free from disease the entire season."

Upon receipt of the foregoing from Dr. Powell, I at once wrote to him for the names and addresses of the number of experienced stock men from interviews with whom he formed the opinions he refers to. Dr. Powell re-

plied he could give me the names of but four gentlemen, stock-raisers, viz. : George Y. Reynolds, J. B. Matthews, J. A. Matthews, and W. L. Bartholow, all of Fort Griffin, to each one of whom I at once wrote, asking for definite information on the subject. In due time I received a reply from Mr. J. B. Matthews, as follows : —

“FORT GRIFFIN, TEXAS, *August 5, 1881.*

“JOS. R. SMITH, *Surgeon U. S. A., San Antonio, Texas* : —

“*Dear Sir*, — Your favor of July 19, 1881, to hand, and in answer to your queries in regard to disease being communicated by Texas cattle, I beg to say that I have lived in Texas and been engaged in cattle raising for the last twenty years, and during that time I have had considerable experience in driving Texas cattle out of the State for market.

“I have at different times, during the period above alluded to, driven cattle from this portion of Texas to Colorado, to Old Mexico, and to Kansas, and I can say without the least hesitation that I do not know, nor did I ever hear, of a single instance of any disease being communicated by Texas cattle, either ‘along their line of march or at the end of their journey.’

“I live immediately on the great cattle trail that passes from Southern Texas north, *via* Fort Griffin, and in all the many herds that pass over this thoroughfare annually, I do not know a single instance of disease being communicated to our stock by passing herds. Indeed, I am quite sure there is no well-authenticated case of disease being communicated in this way to be met with.

“I have often heard uninformed persons, who had no experience in such matters, in Kansas and Colorado, ascribe diseases of cattle, in some instances, to this cause ; but a case of it, in all my long experience in the raising and driving of cattle, has never fallen under my observation.

“I was pleased to receive your valued favor on this important subject, and to have an opportunity to add my testimony in regard to this silly bug-bear of disease being communicated by Southern cattle, which is, doubtless, invented by and manipulated in the interest of speculators, for the purpose of depreciating the value of Texas stock.

“Very truly yours,

(Signed)

“J. B. MATTHEWS.”

In the mean time, receiving no reply from the other gentlemen given me as authority by Dr. Powell, I again wrote, October 5, to Fort Griffin, to the gentlemen before addressed, and others, asking for any and all reports attainable. To this letter the only reply was from Mr. N. T. Eaton, and is as follows : —

“FORT GRIFFIN, TEXAS, *October 13, 1881.*

“DR. J. R. SMITH, *San Antonio, Texas.*

“*Dear Sir*, — Having had twelve or fourteen years’ experience with Texas cattle, I am certain that the disease you mention is contagious, and particularly so in case of improved cattle.

“I am now driving cattle from this place to my ranche in the Pan Handle, near Fort Elliott.

“Last year there was more or less loss to parties ranching and owning

cattle between this and Dodge City and Caldwell, Kansas, to which points the cattle trail leads.

"Native cattle in the Indian Territory are also affected in the same way, when they are all improved stock.

"Parties ranching in the Pan Handle, and raising improved stock to drive to market, invariably lose more or less when they are forced to cross the cattle trail, or mix their stock with cattle driven from the South. To avoid this trouble the ranche men put off their drive until after frost falls. After that time they consider that all danger is passed. It was a long time before I became convinced of the fact that this disease was contagious. I now have no doubt of the facts. The further south the cattle come from, the worse they are to spread the fever, or what name you may give it.

"This disease is a hard question to deal with. I have driven cattle to Colorado, and have mixed them with the improved cattle of that country, on my arrival there, directly off the trail, when it is supposed they are most dangerous from fever. But I have never seen any improved cattle die in that country from the fever. It seems that after you get a certain distance west there seems no further dread of the fever.

"In the extreme western portion of the Pan Handle, joining New Mexico, and the extreme western counties of Kansas, nearest Colorado, the disease is also unknown. Trail cattle can be driven to these sections without danger to either improved stock or to the trail cattle. The altitude of the country may possibly be the preventing cause of the contagion.

"Yours respectfully,

(Signed)

"N. T. EATON."

This letter being received, I at once wrote to Mr. Eaton, begging him to furnish me definite instances, if known, where cattle had been infected in the mode alluded to in his letter. No reply has been received to this last letter, nor has any reply been received from other persons at Fort Griffin. It was my intention, if any specific case was reported to me of disease so communicated from Texas cattle on their line of march, to visit the place in person and fully investigate the whole matter. But no one has reported any such case.

Dr. Powell has made further inquiries at Fort Stockton, and under date of October 29, 1881, writes me as follows:—

"I have had several interviews with the post butcher here, Mr. James Johnson, and learn from him that within the past three months he has lost about ten head of cattle, varying from five to two years of age, one calf about six months old among the number, and one Durham bull, one remove from imported stock. All these cattle died of what he terms the 'dry murrain.' He made two post mortems out of the whole number that died. The pathological conditions found were exactly similar in the two cases, and corresponded with those stated as existing in the cases that died of 'dry murrain,' and were examined by Mr. George Reynolds, of Fort Griffin. (See my letter of June last.)

"Mr. Johnson keeps on hand from eighty to one hundred head, and the extent of their range is from three to four miles around the post. Those he lost were the finest he had, — in best order in point of flesh."

Dr. Powell further reports that he has heard of some diseases on a ranche some seventy miles north of Fort Stockton, near Toyah Creek. From this disease some sixty-five young cattle were reported to have died.

I have requested Dr. Powell to investigate this epidemic and give me full particulars.

Dr. Havard, from Presidio del Norte, writes : —

"No prevailing disease of any kind ; but it has happened that two or three times during the last fifteen years (in very dry years, such as 1879) a large proportion (one to ten) of the herds about the Cheuati Mountains, and upper Chihuahua (Mexico), died, almost suddenly, without apparent cause ; cattle seemingly well sickened ; came to water, circled around a few times, and dropped down quivering, dying within twenty-four hours. I could ascertain nothing further about the cause or symptoms of this singular disease. I learn, however, that these dead cattle had a degenerated liver, or, as my informant stated, a *rotten liver*.

"I am told that a large proportion of skins along the Rio Grande contain the larvæ of a large cattle fly ; these larvæ are black, and nearly as large as hazel-nuts ; they do not seem to distress the cattle nor injure the hides.

"The cattle raised in this region, along the Rio Grande, about Presidio del Norte, and on the foot-hills of the Cheuati Mountains, all belong to the Texas and Mexican breeds. They appear to be in excellent health, generally keep in very good condition, and furnish beef of excellent quality.

"I have asked the principal cattle raiser in the town of Del Norte to give me in writing the diseases to which cattle are most liable in the northern part of Chihuahua, and he sent me the inclosed paper, which I forward, with a liberal translation : —

" 'DISEASES PREVALENT IN CATTLE (NORTHERN BORDER OF CHIHUAHUA).

" '*Disease of the Bladder.* — Symptoms : Quietude ; wasting ; little or no appetite ; blood in urine, an indication of inevitable death. Having opened many cattle dead of this disease, the bladder was found full of blood. This disease prevails in the fall, and is somewhat contagious, or rather epidemic.

" '*Disease in the Head.* — Symptoms : Quietude ; tendency to drop the head ; little appetite ; intense dryness of the horns, to the point of looking (the anterior part) as if it had been exposed several days to the sun [*sic*] ; when they reach that stage they die. It has been observed that by cutting off in time a piece of the horns so as to make them bleed, many animals are thus saved. It is contagious.' [I think the writer means epidemic.]

" '*Disease of one of the Quarters.* — More common in young cattle. There is lameness, sudden ; on bleeding the affected part, the blood, as well as the muscles thereof, are black, while they retain their normal appearance in the other parts of the body ; death follows in a few hours ; appears contagious [epidemic].'

" (These diseases appear periodically and are epidemic.)

"He is a tolerably intelligent Mexican, but, I fear, a poor observer, and his nomenclature is a most unsatisfactory one, and unfortunately the river

is so high that I cannot ride over to interview him. He makes no mention of tuberculous, lung, or liver diseases, of which I know there is a certain proportion, because, as I suppose, here these diseases, in cattle or in man, do not progress far, seldom develop fairly into the second stage, and are very seldom fatal; for instance, I have been consulted by a number of consumptive Mexicans around about here, in whom the incipient symptoms were evident, but I have not yet seen one with a tuberculous cavity.

"This variable climate does not prevent the inception of consumption, which is here as common as anywhere among the ill-fed and ill-housed poor, but it seems to possess the virtue of checking its development, although patients, as far as I have observed, do seldom entirely recover.

"I have questioned the principal butcher of Del Norte, a trustworthy, intelligent Mexican, in reference to pathological appearances. He said that he never saw tubercles in the lungs (they might readily escape his notice), but he had seen them rather frequently in the liver (in the proportion, he estimated, of from five to eight per cent.), and a little less frequently in the spleen. He describes these tubercles as light-yellow masses scattered through the organ. The animals thus affected were mostly young, fat, and apparently quite sound, and the meat as readily sold and consumed as any other. The livers thus diseased are not sold, but I suspect they find their way to the kettle of the poor. Now is there any relation between the eating of the liver and meat of these tuberculous cattle and the mild form of phthisis prevailing here? It may be so, although this phthisis may be, I think, easily accounted for otherwise, in the great variations of temperature, and the utter neglect of hygienic precautions in shelter, food, and cleanliness.

"In reference to the last disease on the list, which might suggest charbon, I should say that I have not heard of anybody ever having suffered with it, and that apparently it is not any more common in Mexico than in the United States. As to age, the above-said butcher told me that he has often seen cows and oxen with their teeth worn out flush with the gum, and which he thought were from twenty to twenty-five years old when killed for the market."

Dr. Havard further reports the mortality (outside of the disease above described) as about ten per cent. "The deaths, mostly among the calves, are due to exposure or casualties."

Dr. Woodruff, at Fort Stockton, writes: "The cattle killed are this season in very good condition; fat and healthy, owing to the fine grass, and they showed no signs of disease. I have inquired of various stock-raisers who visit this post, and give the statements which several of them have made to me, and the conclusions they have formed.

"Mr. Rooney has one thousand head of cattle on the Pecos River. He lost fourteen head of cattle last year, and fifty-four this year.

"The disease has been among his cattle for three or four years. He made a post mortem examination of one animal, and found the gall bladder filled with material, black and thick as tar. Bladder distended with blood; spleen natural; kidney natural. The disease lasts about three days. Symptoms: the animal is sleepy; froths at the mouth.

"Mr. Richards says that he lost out of his herd, on the Pecos River, about fifty head last year, and fifty head this year.

"The disease prevails the most in October. His observation of a post mortem examination is that the spleen was black and soft; the first stomach contained weeds; the fourth stomach was natural; the bladder was empty.

"Mr. Kieeling, a stock-raiser on the Pecos, has found the bladder filled with black fluid. He thinks there is no disease among the herds on the Pecos, but the cattle eat poisonous weeds. He has a herd of 1,300, and lost none last year, but has lost eighty-seven this season. Cows and yearlings are affected, very few cows being lost. He has seen blood come from the mouth.

"Mr. James Johnson, who has a small herd in the vicinity of the post, has lost two head this season. The animals urinated blood, and the bladder was filled with blood.

"The shoulders are much ecchymosed; there is running at the nose of white, slimy matter; abdomen much swelled, and wind escapes upon puncture of the abdominal walls.

"The cattle, in his opinion, do not die of old age, nor starve to death. He cannot speak with certainty of the nature of the disease.

"Mr. Peirce, a large stock-raiser, thinks it is a poisonous weed which destroys the cattle. This weed is known as *Yerba loca*, and although I have diligently sought it, I have not been able to find it. There is none in this immediate vicinity, but it abounds on the Pecos, it is said.

"Judge Frazer has a herd of cattle at Leon Springs, nine miles from the post, numbering four hundred animals.

"He describes what he calls an alkaloid disease, which results from drinking too much salt water. They grow stiff in hind and fore shoulder, the head swells, they dribble at the mouth.

"He lost sixty head in one season from the above cause. He also states that it is the young animals in the herd, and the old generally escape.

"I have found, from my observations, that the cattle in this vicinity are in much better order than they were last year, when there was a dearth of grass.

"Beef is the only fresh meat procurable in this region, and it is eaten two or three times a day by all. I know that the beef is far superior to that of last year.

"The increase of mortality in the herd of Mr. Kieeling, on the Pecos, has arisen, I am much inclined to think, from the eating of poisonous weeds.

"The number of cattle near the post is very small; there are no Northern cattle among them; they consist entirely of the native breed."

Dr. Girard, from Fort Davis, reports: "At Fort Davis the beef contractor purchases his cattle, as a rule, in the valley of the Pecos River, where the greater portion have been raised, the parent stock having been brought from other parts of Texas.

"Two or three parties are engaged in improving their small herds by the introduction of foreign blood; as far as I could learn, the imported animals

are all bulls, and were part of a herd of some three hundred head, of more or less pure Durham breed, which were brought from Kentucky to New Mexico in 1876. There are but few of these animals in this vicinity, and they do not appear to have suffered from any disease since their arrival in this region. I understand, however, that among the present herd, when first imported into New Mexico, a number died from eating a certain 'thistle.'

"The cattle raised about Fort Davis are, according to all accounts, perfectly healthy, and have not suffered from any disease or epidemic for years. I hear, however, of a certain 'murrain' which killed a number of them near Fort Stockton, two or three years ago; what affection this 'murrain' was, I cannot well make out. A few animals, it seems, die every spring from drinking the impure and nauseous contents of half dried up 'water-holes,' where the water lies stagnant through the winter.

"At Toyah Creek, some thirty miles north of Fort Davis, a few cattle died last summer from eating certain plants, the character of which I have not been able to ascertain. With these exceptions, the cattle of this country enjoy sound health, and mostly end their lives in the shambles, a few dying occasionally of starvation or old age.

"As to the annual mortality among the herds, no positive answer can be given, so few animals dying from natural causes; the greater number of them are perfectly healthy, and are slaughtered for consumption while still comparatively young; this applies particularly to steers, while cows are allowed to live for the milk they furnish. Some well-informed men tell me that were the herds not interfered with, the annual mortality would not average more than eight per cent."

Dr. Brown succeeded at Fort Davis the writer of the last quotation, Dr. Girard. Dr. Brown writes from that post as follows:—

"The following facts in regard to a curious disease among the cattle, produced by eating the *Astragalus mollissimus*, are obtained from a variety of reliable sources, and may be depended upon as authentic. There is a brief allusion to this affection in a communication from Assistant Surgeon Peter Moffatt, U. S. A., Fort Garland, Colo. ("Report on Hygiene," p. 258.)

"The plant is there mentioned as the *Oxytropis lambertii*, but I am assured by Assistant Surgeon V. Havard (who carefully examined some specimens at my request) that this is an error, and that the herb in question is an *Astragalus* and not an *Oxytropis*. This plant, called by the Mexicans *Yerba loca*, or mad-weed, is one of the first to make its appearance in the spring before the grass has grown to any extent. If the animals once get a taste of it they acquire an inordinate fondness for it, and will neglect all other food to obtain it. A short time after it is eaten it produces a species of intoxication, with symptoms not unlike those of *mania à potu*. The animals become wild, run around in an aimless way, tossing the horns and lashing the tail. There is a great fear of passing objects, and conception of distance and size seems to be lost. A stick in the road looks as big as a log, and they will jump ten feet in trying to get over it. They will run directly against a wall or house, from lack of perception of the distance it is from them. Intolerance of light seems to be marked. When the acute

symptoms pass off diarrhœa sets in, the coat gets rough, and the hair falls out; the animals grow poorer and poorer, with great weakness and anorexia, and finally die emaciated to an extreme. In cases of recovery it is said that they are liable to another attack the ensuing spring, without further indulgence in the noxious weed, but I have my doubts of the truth of this statement. It is also said to produce toxic effects when administered to human beings, and to be in use by the humble 'Brinvilliers' of Mexico to relieve themselves of obnoxious parties; but I have not been able to secure any definite information on this point.

"I inclose herewith specimens of the plant in question. It is now too late in the season to obtain the blossom, which is a purple cluster, not unlike the garden larkspur.

"I also think it worth while to mention a peculiar fetidity of the milk of the cows in the spring of the year. This is so offensive as to be almost undrinkable, and a singular peculiarity about it is, that the fetid smell and taste is greater after the milk has stood some hours than it is when first drawn from the cows. I have carefully investigated this phenomena and have come to the conclusion that it is due to the ingestion of the *Cucurbita perennis*, a species of gourd which is very common here, of the young succulent leaves of which the animals are very fond in the early spring before the grass has grown.

"I inclose a specimen of the leaf. In the green state the peculiar odor can plainly be perceived."

Now, after all the foregoing, I regret to be obliged to present this report still incomplete; that is to say, I believe that many important facts are yet to be collected bearing on this subject, and, therefore, final conclusions may not yet be drawn. The post mortem observations I present are worthy of entire reliance. With but few exceptions they are of healthy animals. Pathological appearances have been described heretofore by many observers.

I think, too, the facts here reported prove that the herds of Texas cattle, when grazing on their prairie pastures, are singularly free from disease, — certainly from any disease recognizable by the ordinary tests of disease, namely, symptoms and pathological appearances.

If so many assertions had not previously been made, and so many witnesses heretofore cited, where Texas cattle, apparently healthy, had infected other cattle, mingling with them, crossing their line of march, or following them in their grazing grounds, the inference from the foregoing would be undoubted, that there was no danger to be apprehended to other cattle by exposure to cattle from Texas. Whether some of these instances do not deserve another interpretation is in my mind a question. Certainly, in many of them, accounts of which I have perused, there is no such rigorous analysis of facts as shows the conclusions drawn to be inevitable.

From the fact that imported cattle from the North soon after arrival in this Southern clime sicken and die in great numbers, it cannot be logically concluded that such death results from infection from Texas cattle, and certainly in many instances of this kind not the slightest evidence is offered of any intermingling of imported and natives. On the contrary, as in the

case quoted on page 244, "Transactions American Public Health Association," vol. vi., it is stated by the owner of the Durham stock, that sickness and death appeared among his newly imported Durhams before their arrival at and on the way to their home near Mason.

It is well known to importers of fine horses in this country that considerable risk attends their importation, and this, when kept by themselves in cities, and in private stables. Emigrants, too, are subject to disease, not all of them, but a sufficient proportion to make the matter an element in considering the subject of emigration.

Now this sickness of newly-arrived men and horses has always been considered due to some acclimating process. The idea does not lack probability that the sickness and mortality among the imported cattle are due to a similar acclimating process.

The weight of the spleen deserves careful consideration. The mean of all my figures gives the weight of the spleen as exactly two pounds. The spleen of Texas cattle, weighed under the supervision of Dr. Rauch, in Chicago, gives an average weight of two and a half pounds, while those of the natives reported by Dr. Rauch (Illinois, probably, or vicinity) average less than one and a half pounds. The ages of these cattle are not given.

Dr. Powell, at Fort Griffin, found that the weight of spleens increased regularly at different ages up to five. The figures deduced from all my reports agree with this. The average weight of spleen, classed according to the age of animals, was as follows:—

In animals aged two years, 1.68 pounds. In three-year animals, 2.18 pounds. In animals aged four years, 2.45 pounds. In five-year animals, 2.85 pounds.

If the animals reported in Chicago were three, four, and five years old, according to the weights just given for those ages, the weight of the spleen should have averaged two and a half pounds.

The spleen further appears, according to my observation, to vary with the weights of the animal generally. From Fort Ringgold, Texas, I have quite full data from seventy-four animals killed for beef, and I take this place because every animal reported from there is fully reported.

Of all these beeves the average net weight was	301 pounds.
Of thirty-eight, the weight of whose spleens was between one and two pounds, average weight was	267 pounds.
Of twenty-seven, the weight of whose spleens was between two and three pounds	346 pounds.
Of nine, the weight of whose spleens was between ^{circled} and three pounds	312 pounds.

Before, inferring, then, from the weight of spleens as to the health or disease of the animal, it certainly may be demanded that the weight and age of the suspected animal also be given. There is abundant reason, from the figures and statements of this report, to believe that the spleens of cows in this climate are heavier and larger than those of Northern cattle. The average weight of all the spleens here reported was 1.98 pounds (almost exactly two pounds), and the reports are from all over the State. There is no part of the State where there is less reason to believe that disease exists

among the cattle than in the vicinity of Forts McKavett or Mason; yet in Dr. Waters' report from there he says that "only three or four (spleens) weighed as low as one and a half pounds." In numerous cases where the spleen weighed two and a half pounds and upwards, the observer has distinctly said that all the other organs seemed healthy, or that the animal appeared in good health. Our knowledge of the functions of the spleen is still quite imperfect. The numerous observations of Dr. Rauch, that where the spleen was of unusual size, the liver varied inversely, — being unusually small, — would at least give ground for suspicion that in these cases the functions of the two organs might be complementary.

Certainly the Darwinian can see no difficulty in the conclusion, that a two pound spleen may be a normal organ in Texas, and a one and a half pound spleen a normal organ in Illinois.

Professor Gamgee made a number of post mortem examinations of cattle in this State. His exact language I am unable to quote, as I have no access to his report, but only to that version of it on page 114, "Special Report No. 22, Department of Agriculture," 1880. From this it appears that Professor Gamgee found an "abnormal weight of the spleen, coupled with gastric redness, erosions, pale blood, and frequently the presence of bloody urine in the bladder. Undoubtedly these animals were diseased, and these pathological appearances so prove. The citation does not state that they were not recognized as sick before this revelation by the post mortem knife, but the context makes this the natural conclusion. With my present experience with diseased cattle it does not appear to me possible but that a proper examination before death would have discovered the ill-health of these animals. Observations as to the weight of healthy spleens will be continued by me during the coming year.

A few words in reference to the temperature observed in cattle: —

Before beginning my study of this subject, my ideas of the temperature of cattle were quite vague, and the first reports received from Corpus Christi, where the average temperature appeared as over 103° F., staggered me.

Could their natural temperature be so much higher than that of the human body? But not only were the next reports conformable to this first one, but *all* received were to the same effect, and the average temperature of forty-five cattle, as reported to me by five different observers, was 102.59°.

I know of no observations made for the purpose of determining the normal temperature of these animals.

In looking over the volume of "Researches, Physiological and Anatomical," by John Davy, published in London, 1839, I found some experiments reported by him.

He states that the temperature of the blood of an ox flowing from the carotids was 100° in summer, at Edinburgh, and that the temperature of an ox ascertained the same way in Kandy, May 28, was 102°, the atmosphere at the same time being 80°.

When, further, I saw the temperature of fever in these animals, as ob-

served by Professor Gamgee, given as from 106° to 110° , I came to the conclusion that the normal temperature of cattle exceeds the human temperature four or five degrees.

Further observations in this direction will be made during the ensuing year.

I must again repeat that in this report, and the one on this same subject made to the Association in December, 1880, I have been trying to ascertain whether the cattle of Texas are habitually unhealthy or diseased; whether any such disease prevailed among them as made them dangerous as sources of infection if driven to Northern markets, and to find out whether it ever occurred that these cattle, being themselves healthy, could nevertheless communicate not only once, but habitually, disease to healthy cattle with which they came in contact. The Texas or Spanish fever, pleuropneumonia, and other diseases, have from time to time been investigated and described by competent observers. From Dr. Rauch's full report on Texas fever made to the Chicago Board of Health for 1868, I make a few extracts, as bearing on the subject I am pursuing. Page 203, Dr. Rauch says: "This disease is undoubtedly transmitted by native to native in the same manner as by Texas to native," and he cites a case on the same page where "native cattle were purchased at Chicago in August and taken to Lebanon County, Pa., and that a short time after they died, and that other native cattle of the same farm and neighborhood died; and that no Texas cattle had been nearer the place where these animals died than the railroad while in transit to New York and Philadelphia, which must be at least three miles distant. Dr. Rauch further says: "The assertions that native cattle die of this disease, and do not communicate it to other native cattle; that Texas cattle are perfectly healthy, and still cause disease that is fatal to native cattle, and that they do not die of this disease, are such anomalies in the history of contagious diseases that, on general principles, we could not believe them."

The legitimate deductions from the reliable facts and statements contained in this present report are entirely in harmony with the views enunciated by Dr. Rauch.



